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Inversion of the Central Carpathian Basin constrained using low temperature thermochronology and its implications for Carpathian orogenesis.

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The Central Carpathian Basin (CCB) developed on the northern edge of the ALCAPA plate as a forearc basin. Marine sedimentation in the CCB lasted from Eocene to at least early Miocene times. Termination of sedimentation within the northern part of basin was linked to the uplift of the basement block that now forms the Tatra Mountains with remnants of the CCB now preserved to the north and south. This study focuses on the northern remnant, the Podhale synclinorium, where previous illite/smectite (1), vitrinite reflectance studies (2) and apatite fission track studies (3) indicate that erosion from 17 Ma to 0 Ma removed from 2.5 km (in the west) to 7 km (east) of sediment. Recent dating of remnants of early Miocene molasse sediments in Podhale synclinorium and in tectonic units directly to the north of the basin suggests a record of sedimentation prior to, and during, the early stages of basin inversion. The Miocene development of the inner Carpathian Mountain chain was associated with northward thrust propagation of the outer Carpathian flysch nappes over the foreland. This project aims to determine the timing and magnitude of erosion and deformation at this defining time in the evolution of the Carpathians and was supported by the EUROCORES programme TOPO-EUROPE of the European Science Foundation.

We are performing apatite fission track (AFT) and apatite and zircon (U-Th)/He analyses of Podhale basin Paleogene sediments and Mesozoic alpine basement rocks from the 4.6 km deep 'Banska IG-1' borehole, along with Paleogene tuffs form a north to south transect through the synclinorium. A 3D seismic survey in the area of the 'Banska IG-1' borehole and reinterpreted 2D seismic lines through the Podhale synclinorium provide additional constraints on the timing, style and amount of deformation. Available seismic data indicate that there is significant angular unconformity between the Paleogene flysch and older Eocene Numullite beds. This might suggest early phases of uplift of the Tatra block, already during deposition of the lowermost part of the Paleogene flysch sequences. Provisional results record the central apatite fission track ages from the Banska IG-1 borehole range from 21.4 $\pm$ 2.7 Ma at 750 metres depth to zero at 4.6 km. Zero AFT ages become frequent in apatites from below 2274 m reflecting the present-day partial annealing zone. AFT ages are significantly older than narrow group of young AFT ages between 12 and 6 Ma reported from the surface in this area previously. AFT age distribution along with provisional apatite (U-Th)/He ages of the Paleogene tuffs range from 10 to 20 Ma suggest that amount of erosion was smaller then reported previously with no evidence for large exhumation during last 5 Myr.

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